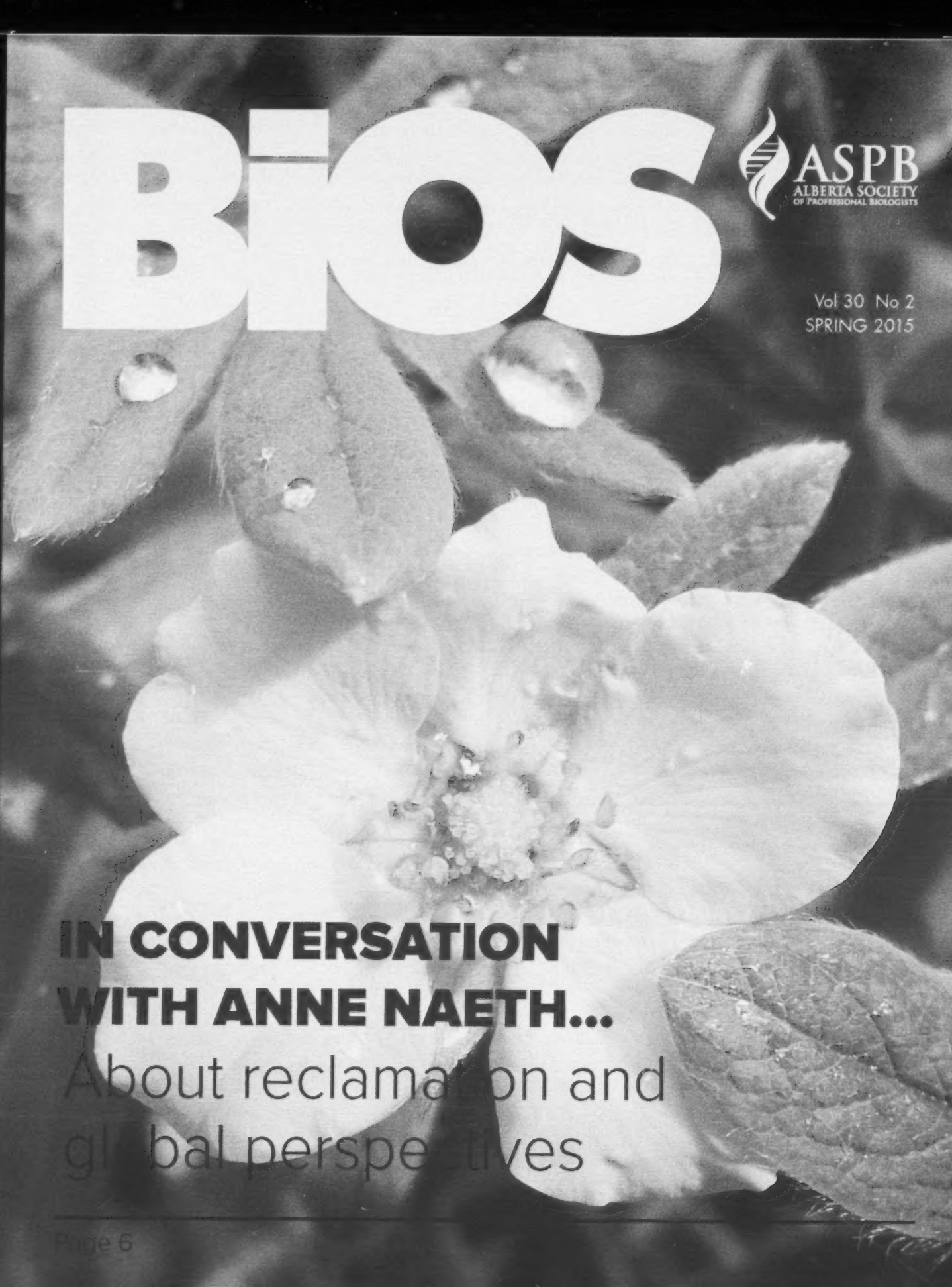
BIOS

ASPB
ALBERTA SOCIETY
OF PROFESSIONAL BIOLOGISTS

Vol 30 No 2
SPRING 2015



IN CONVERSATION WITH ANNE NAETH...

About reclamation and global perspectives

ASPB
ALBERTA SOCIETY
of PROFESSIONAL BIOLOGISTS
370, 105-12th Ave SE
Calgary, AB T2G 1A1
T 403.264.1273
E pbiol@aspb.ab.ca
W www.aspb.ab.ca

EXECUTIVE:
President
Chris Clement, P. Biol.
President Elect
Shaun Toner, P. Biol.
Past President
Karoliina Munter, P. Biol.
Secretary
Angela Holzapfel, P. Biol.

DIRECTORS:
Gary Ash, P. Biol.
Nick Bartok, P. Biol.
Bruce Greenfield, P. Biol.
Don McCabe, P. Biol.
Darrell Jobson, P. Biol.
Susan Patey LeDrew, P. Biol.
Sara Bumstead, P. Biol.
Public Member
David McInnes, ICD.D

ADMINISTRATION:
Executive Director
Jennifer Sipkens
Administrative Assistant
Jody Smith

COMMITTEES:
Awards Chair
Dave Ealey, P. Biol.
Discipline Chair
Brian Bietz, P. Biol.
Mentoring Coordinator
mentoring@aspb.ab.ca
Practice Review Chair
Carol Engstrom, P. Biol.
Professional Development (Calgary)
Ken Chatel, P. Biol.
Professional Development (Edmonton)
Chris Newton, P. Biol.
Registrar
Bette Beswick, P. Biol.
Registration Chair
Erin Rooney, P. Biol.

Cover Photo
Photo by: Nick Bartok, July 2011.
Cinquefoil flower (Potentilla) taken just north of Fort McMurray, AB.

BIOS
is published quarterly by the Alberta Society of Professional Biologists for the benefit of its members and for those interested in the field of professional biology.
Managing Editor:
Jennifer Sipkens
Editor:
Peter G. Kingsmill
Articles or comments are welcomed and should be sent to announcements@aspb.ab.ca

...notes from the E.D.

Our Society has a long and honourable tradition of hosting excellent annual conferences, and the upcoming celebration of the ASPB's 40th Anniversary Conference at Canmore is shaping up to follow that tradition in every way. We have outstanding speakers and presentations lined up, a very special banquet speaker in broadcaster Jay Ingram, and a spectacular host city nestled in the foothills: Canmore. We will keep or fingers crossed for great weather!

Around the office and the board, we often tend to think of the conference itself as a year-end milestone, and this past year has been a time of substantive change leading up to the ASPB's 40th anniversary. The Society has "grown up" from having a management company company be the first point of contact and handle our administration, to having an office and staff handling our own affairs. Also, the membership has voted in favour of adding biological technologists and expanded the breadth of biologists in the Society by including as Registered Biologists those who are 1-3 biology courses short of the requirements for Professional Biologist.

At the board level, the transition to Policy Governance® is moving forward. We continue to learn more about this model of governance and and how the board can engage the membership in setting direction for the ASPB while ensuring management is adhering to established policies.

The new website is coming into being, and our members will have already experienced some components of that through their membership renewal process which has necessitated some technical fine tuning and patience from our members as it rolls out. With a growing number of new applicants for ASPB membership, the ability to apply online to the ASPB, and with the registration committee able to review applications online as well, the new website will really begin to shine as the processing of applications will be far more efficient through the use of internet technology.

The growth we are experiencing is exciting, but perhaps even more so is the energy I feel from our volunteers and those who are new to ASPB. There is a genuine excitement and interest in becoming a member of our organization, and I only see this continuing and growing as we move through this time of change!

Jennifer Sipkens, ASPB Executive Director

A reminder to all ASPB Members
to attend the 2015 Annual General Meeting:

Meeting Date: **Monday, March 30, 2015**
Meeting Time: **2:00 - 5:00 p.m.**

Canmore Location: Coast Canmore Hotel and Conference Centre
Calgary Location: University of Calgary Downtown Campus (Main Floor)
Edmonton Location: NAIT Nexen Theatre (Y240)

The AGM is free for all ASPB members to attend.
PLEASE RSVP YOUR ATTENDANCE
Go to the ASPB website, to the Member's Log-in page, then go to Events and register at the location of your choice.

Looking back on a great year: a message from the ASPB President

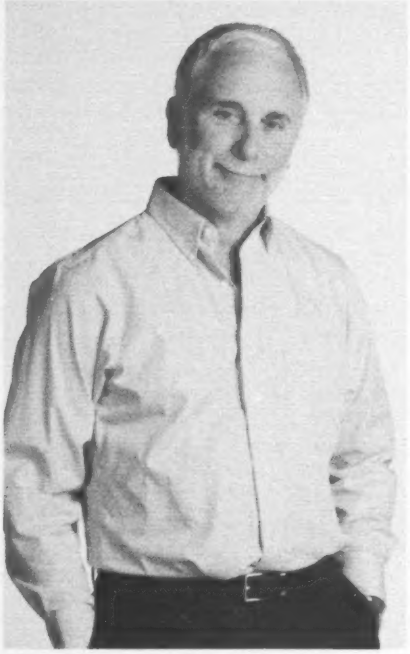
by Christopher Clement, P. Biol.

The ASPB continues to be a strong, flourishing, and vibrant professional organization with our membership now more than 1,700. There is no doubt that the membership will attain a level of more than 2,000 within a few years. Obviously those who become members recognize the true value of being a member – professional regulation, opportunities for networking, and promotion of ethical biology practices.

I know as I complete my term as your President that the ASPB will be in excellent hands. The board has evolved in the last two years with the adoption of policy governance and the executive management by Jen Sipkens has helped us to advance in leaps and bounds. On behalf of the board, I want to personally extend my thanks to Jen for her tireless work and assistance to the board and the membership. In the last year the board participated in two policy governance workshops which have helped to keep us on track as we move forward; as well the board continues to promote the ASPB and all it stands for.

I have had the privilege of sitting as a board member and serving as president in both B.C. and Alberta. I can assure you that we are now recognized by other professional organizations, including the College of Applied Biology in B.C., industry, and government as a significant force to be reckoned with. The profession of biology offers amazing opportunities to those who choose to practice as biology professionals: opportunities to be involved in exciting research, a chance to work in remote, exciting, and challenging environments, as well as to teach those around them what it means to be a good professional biologist or technologist in biology. I know that all of our members support our direction as we continue to evolve and grow and I can assure you that the incoming board will continue to enhance our reputation, credibility, and status. Thank you.

Right versus Left



Jay Ingram, one of Canada's best-known and most popular science personalities, posits that the two hemispheres of the human brain have been the subject of much deep-thinking, myth-making, and sometimes outright BS. When he delivers his banquet address, titled "Right versus Left" at the ASPB's *Witness to Change* conference, he will discuss how too little emphasis has been put on the hemispheric differences in birds and animals, and suggest these differences should be taken into account as part of the effort to understand what's really going on.

Ingram has hosted both the premier radio science program in Canada, CBC's Quirks and Quarks, and its TV counterpart, Discovery Channel Canada's *Daily Planet*. In 2010, Ingram was appointed as a member to the Order of Canada for a lifetime of service in science communication. He has received several awards for his work, including the Queen Elizabeth II Diamond Jubilee Medal and honorary degrees from Carleton University, McGill University, McMaster University, King's College and the University of Alberta. Since 2005, he has been Chair of the Science Communications Program at the Banff Centre. He is also co-founder and Chair of the arts and engineering mashup called Beakerhead, which began in September 2013 in Calgary.

A prolific author, Ingram has written 12 books, most of which have been best-sellers and many have been translated into 14 different languages. His thirteenth book, *The End of Memory: A Natural History of Alzheimer's Disease*, was published last month.

Moving forward with biology technologists

by Jen Sipkens, ASPB Executive Director

In 1986, before Alberta Society of Professional Biologists (ASPB) members could legally call themselves "Professional Biologists (P. Biol.)", C.B. (Chris) Powter stated the following in BIOS: "It seems to me that we are missing an important segment of biologists under (then-existing) regulations, namely the graduates and students of Alberta's technology schools".

Biological technologists collect data in the field and in the lab. This data is then interpreted and reported on by Professional Biologists; having technologists regulated means that those collecting the data are held to the same code of ethics and disciplinary action as P. Biols. It also means they will be able to participate in continuing competency programs to ensure they maintain their standard of practice.

This important segment was voted into the ASPB by the membership at a special general meeting in May 2014. This prompted the provincial government to begin work to add technologists into the ASPB as a separate membership stream. The government is moving forward with the technologist category, but not the Professional Technologist in Biology (a category which would have sign-off) which does not fit under POARA, our current Act. The Registered Technologist in Biology will be the principal membership category for technologists.

As a professional society and self-regulating body in Alberta, the ASPB is committed to the promotion of excellence in the practice of biology. This commitment will strengthen as the ASPB becomes able to regulate more biology professionals and biological technologists, affording better protection to the public, which is the mandate of the ASPB. As long-serving professional member of the ASPB (and proponent of including biology technologists) Robin Leech comments, "the designation for technologists is viewed as especially important for those who have technical responsibilities for sampling and data collection... 2015 will be a pivotal year for Alberta professional biologists and technologists."

Bette Beswick to receive Distinguished Service Award

Volunteerism is always a welcome practice, and is often rewarded by accolades from neighbours and peers and a heightened sense of "doing the right thing" for fellow human beings (or creatures, or the environment, and the list goes on).

The proper functioning of the Alberta Society of Professional Biologists relies heavily on volunteers. These are rather private volunteer functions, serving on committees or on the board of directors, and are functions that most likely don't leave the same afterglow as helping to feed hungry children or saving sea lions.

But without them, the ASPB would probably not survive, and if it did, the increased price of annual membership fees (and all other services) would put membership out of reach for many biologists. With this in mind, the members of the ASPB Registration Committee came together to nominate Bette Beswick, the Society's Registrar and devoted volunteer, for the Distinguished Service Award for 2014. They prepared the following letter:

"Bette has been a positive and caring force as the ASPB registrar for several years. Dealing with applicants is not always easy, especially when they are not successful in their application. Bette is compassionate and works tirelessly with people to guide them through the application process and discuss their options with them. Each case is different, and the time required to review and respond to each applicants' file would be significant, and Bette is extremely responsive. I have heard anecdotally from a few people who have gone through the application process (some successfully and some not) that Bette has been extremely helpful to them. They all refer to her by her first name and are fully aware of where they sit in the application process.

"Bette takes the time to review the applications prior to the meeting to minimize the time of the other volunteers, which is greatly appreciated and very selfless of her! She often has to remind the Registration Committee of the back-story of certain applicants from week to week, and has often spoken to several people with unique application situations on the phone. She has had some very difficult situations handed to her over the years, and deals with them gracefully. She recounts the stories to the Committee with a smile on her face.

"We value all that Bette has brought to the ASPB over the years as a volunteer. Our membership is strong because of her leadership in facilitating the registration process. We hope you consider our nomination." **(Signed by the members of the Registration Committee.)**

Bette Beswick will receive her award during the ASPB Witness to Change Conference later this month.

Registration Committee Reviews 530 files in 2014

The Registration Committee of the Alberta Society of Professional Biologists is responsible for considering applications for membership to the Society and approving, refusing or deferring applications for membership.

As a result of additions in membership categories to the ASPB in 2014, the Registration Committee now reviews applications for membership for Professional Biologist (P. Biol.), Registered Biologist (R. Biol.), Biologist in Training (BIT) and Registered Biologist in Training (RBIT). The R. Biol. and RBIT categories are new.

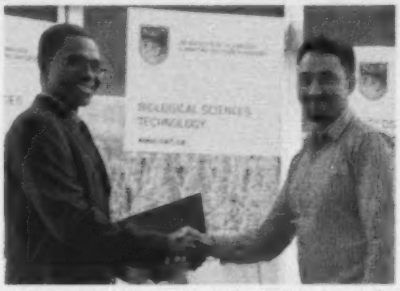
In 2014, the RC reviewed approximately 530 files, resulting in 384 approvals (164 P. Biol., 201 BIT, 6 R. Biol., and 13 RBIT). The remaining applications (146) were deferred pending submission of additional information by the applicant, or denied because membership requirements were not met.

In 2014, the following individuals participated on the RC: Janet Bauman (Past Chair), Mark Boulton, Tara Caseley, Bernd Martens, Ricardo Moreno, Mike Peckford, Henri de Pennart, Erin Rooney (Current Chair), Bob Shelast, Rob Simieritsch, Sylvia Taylor, Shaun Toner, and Carl Warner. RC meetings were also attended by the Registrar (Bette Beswick) and the Executive Director (Jen Sipkens). The Committee met nine times.

Student excellence recognized through ASPB scholarships at NAIT

Chanelle Sankey received the ASPB Award for Renewable Resources (NAIT) from Dave Critchley, P. Biol, Associate Chair in Biological Sciences.

Rajan Giri received the ASPB award for Laboratory and Research (NAIT) from Biological Sciences Instructor Marcelo Marcet.



Kalidas Niraula received the ASPB award for Environmental Sciences (NAIT) from Biological Sciences Instructor Emmanuel Mapfumo.

Three students enrolled in the second level of the Biological Sciences Technology program at the Northern Alberta Institute of Technology (NAIT) received scholarships from the Alberta Society of Professional Biologists in February.

Says Kalidas Niraula, who received the Environmental Sciences scholarship, "Having received this award motivates me to continue to succeed and improve in my studies (and has enabled me) to have a balance between school and home life, and for that I am grateful." Kalidas intends to enter into the workforce as an Environmental Technologist.

Chanelle Sankey, recipient of the ASPB award for Renewable Resources at NAIT, is currently enrolled in her last semester in Renewable Resources - Biological Sciences Technology, and she is the Program Representative on the Student Council. "My dream is to work in fisheries management and eventually become a Conservation Officer," she writes. "Thanks to this scholarship, my financial burden is lessened and it allows me to devote my time solely to my studies and volunteer opportunities."

Rajan Giri received the ASPB award for Laboratory and Research at NAIT. "This scholarship means a great deal in my professional career and will always inspire me to work hard and be focused on achieving my professional goals," he writes. "My area of academic and professional interest includes molecular biology, proteomics and oncology; receiving this award will definitely help to support my tuition expenses and will allow me to focus on my studies. Thank you, ASPB, for supporting my aspirations of learning and working in the biological sciences field.

The ASPB Awards Committee: honouring scholarship, service and volunteerism

by Committee Chair Dave Ealey, P. Biol.

The ASPB Awards Committee has been established to review annual nominations received for several award categories: the Soper Award, the Peggy Thompson Publication Awards, the Distinguished Service Award, and the Volunteer of the Year Award. The committee selects the most suitable candidate for each award, based on the nominations received and criteria that assess the quality of each nomination and reflect the professional standards of ASPB. The committee includes the chair and two ASPB members who meet each year, following the close of nominations, to make their selections and to ensure recognition awards are available for presentation at the subsequent Annual General Meeting.

Nominations for 2015 awards were reviewed on February 25, 2015. Nominations were received for Distinguished Service Award and two categories of Peggy Thompson Publication Awards. Results of the committee review of nominations will be announced at the 2015 AGM.

The results of the 2014 awards were announced at the last AGM and in the ASPB Bulletin and BIOS.

The first recipient of the new Distinguished Service Award was Ken Chatel, P. Biol., and a newly designed plaque was on display at the 2014 AGM and presented to Ken later in the year. Ken was nominated for this award by Stacey Schaub-Szabo, P. Biol., with supporters Jen Raffan, BIT, and Carol Engstrom, P. Biol.

Five submissions were received for the 2014 Peggy Thompson Publication Awards: one scientific paper, two biological technical reports and two publications for communicating to the general public. Dr. Robin Leech, P. Biol., was recognized for his scientific paper, Dave Downing, P. Biol., received the award for the technical report category, and S.K. Basu, P. Biol., for his publication for the general public.

In addition, the Awards Committee helps with the coordination of Science Fair awards for the Edmonton Regional Science Fair. At the 2014 Science Fair, Rebecca Felske and Alexa Bernard from Busby School received the 2014 ASPB award for their project: Do The Eyes Have It?; Honourable Mention went to Mackenzie Denesik of St. Angela School for her project: What Is Growing On My Bread?

I thank Lorna Allen and Linda Zimmerling for their critical insight and good humour as members of the Awards Committee. Thanks also to all ASPB members who made the effort to submit nominations for the Society's awards program. Recognition of members' accomplishments, and their contributions to the ASPB and the practice of biology in Alberta, are essential components of a professional society. I appreciate all efforts to support our awards program.

Linda Zimmerling, Chair Dave Ealey and Lorna Allen served as the 2015 ASPB Awards Committee.

In conversation with Anne Naeth...
About reclamation and global perspectives

*Dr. Anne Naeth, P. Biol., P.Ag., is Professor of Land Reclamation and Restoration Ecology and Associate Dean of Research and Graduate Studies (ALES) at the University of Alberta, where she is also the Director of the Land Reclamation International Graduate School and the Vargo Distinguished Teaching Chair. **BIOS** editor Peter Kingsmill interviewed her by telephone from her home in Edmonton:*

***PK:** I have heard it said that if we choose not to manage change, change will manage us. With an exponentially increasing global population (one that certainly must exceed the planet's ability to sustain the human population if we were to remain close to our evolutionary roots as hunter-gatherers) change no longer creeps - it gallops. From a biologist's perspective, are we in trouble?*

AN: Yes, we are. Thinking about the human population, and what is driving land reclamation, if we simply took the approach that we really don't have to adapt to the increasing population, we would still probably be sitting back where we were many years ago, not even feeling that reclamation was necessary. Back then, we took the approach that everything over time will basically take care of itself, but we are past that now. I think we are indeed at the point where (the planet's) carrying capacity has been met or even exceeded. The trouble is, we don't see those changes so easily when we live in places like Canada, but when you travel in other countries and see increased populations and the changes that has had on the environment, that's where you get a clearer picture of what's really happening, a more immediate sense that things need to change. People who travel extensively probably understand this more readily, because even if you are living in a very populated country, you may not necessarily recognize that you are living in a whole system that has exceeded its ability to be sustainable.

***PK:** You have been leading some components of the Helmholtz - Alberta Initiative (HAI). Could you tell us a bit about the relationship between the University of Alberta and the Germany-based Helmholtz group?*

AN: Helmholtz Institutes in Germany are one of the most internationally recognized research institutions. They do a lot of large research projects which require large amounts of funding; you don't typically find that required level of funding at universities (or, indeed, most other research institutions which are driven more by government or even industry funding). Helmholtz institutes have very specific areas of focus, and we were particularly interested in the ones that focused on energy and the environment. The motivating concept is that researchers from two different countries collaborating on the same research can be more productive than working separately. There are many similarities between Germany and Canada, particularly as it relates to mining, for example; they have a lot of disturbed sites and mine sites both historic and modern-day. So the idea was that we could learn from them and they could learn from us and together we could move the whole energy and environment research focus forward faster.

***PK:** I am particularly intrigued by two statements on the HAI web page. The first is "Within the World community, the highly industrialized countries, in particular, share common responsibilities to assume leadership and to address these complex global issues in a collective effort." This is essentially a call-to-arms for the corporate sector in the developed world to transcend politics and work for solutions. Is that a fair statement?*

AN: That's a very good way to articulate it, and you are correct, that is what we were thinking! It is certainly what I believe.

***PK:** How did it all come together?*

AN: This whole collaborative initiative came together - starting about seven years ago - through what were almost chance meetings between myself and scientists working in the reclamation field in Germany, at a time when the University of Alberta was working to increase its international affiliations and Germany was one of the target countries. Other researchers at the university got involved, as did both governments here (first from Alberta and later from the federal government as well, through NSERC). And of course Germany brought in some money from a variety of sources in that country. It was very much a research-based approach, with governments and industry collaborating with resources to meet the research objectives.

PK: Another statement on HAI's web page poses that "scientific research and technical innovation are ultimately key in providing the knowledge basis for political and societal decision making and are consequently critical for achieving progress towards sustainable solutions to

challenges at regional to global scales." This, I am sure, is readily understood by many scientists - be they biologists, engineers or chemists - but may face some challenges within the social science sector. How is that going so far?

AN: I think a large portion of society is pretty much driven by what it perceives to be important, and what it perceives to be important is closely linked to what the *media* thinks people should be thinking is important. And lots of times there will be a great big issue made about something that the media has really pushed and that society has really grabbed onto. Often, in reality, that is not where we should be focusing our energy, so I think there remains a big disconnect between society and science - be it biophysical or social science. Scientists have a responsibility to reduce this disconnect.

***PK:** One can assume there are no "sacred cows" in the HAI approach, so time-honoured approaches to environmental interference - like mitigation - may need to be re-visited. Has this been a matter of debate?*

AN: It certainly has been a matter of debate. For example, the whole issue of compensatory environments, where a government will allow industry to develop an area for extraction of natural resources, if they build a new natural system somewhere else. The whole carbon offset program speaks to that as well. The approach we have taken in the HAI program, particularly as it relates to the land reclamation area that I work in, is that we are trying to mitigate for whole, basic and functioning ecosystems to reclaim the disturbed ones; to disturb in a more sustainable way, to reclaim in a more timely manner.

***PK:** I have heard a lot about Alberta's new wetland policy.... do you feel it will bring about some positive results? Are there any problematic issues?*

AN: I am always optimistic about these efforts, because they bring awareness. One of the difficult things is that we are trying to build something from an incomplete knowledge base. I am not as involved as others in wetlands, and you may want to discuss this aspect with more directly-involved scientists, but essentially when we put these policies together we build them based on what we *know*. And, unfortunately, we also know there is a lot lacking in our knowledge base.

For example, in Alberta, with some of the regulatory approaches that mining companies had to take, if they were mining an area they had to have zero percent loss of wetlands. But how that was often interpreted, and how it actually played out, was that zero percent meant that if you had "x" hectares of wetlands *before* mining, you had to have "x" hectares of wetlands *after* mining but they didn't have to be in the same location, or be of the same size. So instead of having a whole bunch of little marshes for example, it could be one big end pit lake; when you think of the species that are dependent on a little marsh relative to a lake - it is a very different group of species!

"... we are trying to mitigate for whole, basic and functioning ecosystems..."

So while I think good intent is there with these policies, I am not always sure they are thought through sufficiently to ensure expectations can be met.

***PK:** Overall, do you feel biologists are equipped with the regulatory tools to enable them to work effectively?*

AN: That's such a good question. I don't know the answer, really. Again, I think a lot of the regulatory frameworks are very much driven by an incomplete knowledge base, and it seems like once regulations are developed and requirements are set, we tend to think we know more about it than we actually do. It's one thing to build a regulatory document which sets out what must be done going forward, but if it's based on an incomplete knowledge base, you run into the sorts of difficulties we have found before.

So I am not so sure the biologists are as equipped as they need to be. For example, one of the big issues right now, with any major development, is cumulative effects. How can a biologist be managing for cumulative effects, or even taking them into account, when we really don't understand the full impacts of cumulative effects, their triggers or thresholds. However, I do believe that biologists are better equipped in general, from being educated in programs that not only provide a good scientific knowledge base, but also an application one. Thus they can interpret the regulatory framework from that knowledge base and drive regulatory change from a less top down perspective.

PK: Is the science of cumulative effects at its infancy at this point?

AN: I have never actually talked about it that way - I keep saying "incomplete". But yes, I could agree with that because in essence cumulative effects is a concept we are struggling to better understand.

***PK:** Is the HAI trying to grapple with these sorts of issues?*

AN: I think they are largely grappling with different issues, simply because (from a biological perspective) when you think of Europe versus Canada for example, we have so many more pristine and undeveloped lands. So while we here may be talking about preserving native species of plants and their requirements so we can put them back into the disturbed lands after reclamation, in Germany and many other countries - which have long ago lost all of their native flora - they may not see it as such a big deal. However, HAI is grappling with cumulative effects in general, regardless of the country the work is being done in.

***PK:** So, different social perspectives and different understandings of the role society plays yield different priorities for conservation, restoration and reclamation. It must be extremely difficult to build public consensus about what are the real issues.*

AN: I am an eternal optimist. I keep thinking there is some way we can tap into that public consciousness to have them understand their role a little bit better. Interestingly, we had this discussion in my grad class the other day, and it ended with a number of students saying they "just feel totally depressed," and asking me how I could be so optimistic about people changing.

"We need their input as biologists, of course, but we especially need their input with them believing they can make a difference."

I find it very sad to see that there are many young biologists going out into the world who are not looking at many of the things we are talking about from an optimistic perspective, particularly the public change needed to drive environmental stewardship and their ability to influence that public. We want the public to be informed, not just fearful. That is a role both experienced and young, passionate biologists must play. We need their input as biologists, of course, but we especially need their input with them believing they can make a difference.

***PK:** Thank you!*

Tracking your earning power: ASPB releases 2014 Salary Survey results

The following report has been prepared with technical support from Torunn Landsgaard.

The Alberta Society of Professional Biologists (ASPB) gathered data from its membership through a voluntary salary survey in the autumn of 2014. This is the third such ASPB salary survey; the first survey was released during the winter of 2008, followed by one in December 2012.

In 2014, 327 ASPB members participated in the survey (309 members participated in 2012, and 395 in 2008). Discussion of the results is limited to this sample; the objective of the survey was to determine the range of salaries among ASPB members as they relate to years of experience, education and employment sector. It is anticipated that this information could be used to support salary expectations for biologists in Alberta, as current salary expectation databases available do not typically address professional biology as practiced by the majority of ASPB members.

Of the 327 participants, 179 were female and 148 were male. 242 were Regular members (147 male and 100 female), 77 were Biologists in Training (23 male and 34 female), and there were two Student members, 4 Honorary members and 2 Temporary Withdrawn members. Over half (57%) of the respondents held bachelor's degrees, 39% held master's degrees, and 4% held doctorate degrees (there were no diploma respondents). Almost 59% of the participants had fewer than 10 years of experience, 26% had between 10 and 20 years of experience, and just over 15% of the participants identified as having more than 20 years of experience.

Consulting employees comprised the majority of respondents, at 66%. This is followed by Oil & Gas Industry and Government (municipal/ provincial/ territorial/ federal) employees, at 19% and 12%, respectively. The remaining 3% includes employees of Academia, Non-Government Organizations, and other industries.

Salary Data

A total of 327 salary records were tabulated for comparison. Due to differences in respondents' salary reports (per hour/ per month/ per annum) and the variety of ways salaries can be calculated (e.g. including or excluding overtime, extrapolating monthly earnings for the whole year) these data must be considered with certain variances.

The full report will be posted in the Member Downloads section of the ASPB website.

MEAN SALARY BY GENDER	(Annual)
Males	$106,644
Females	$80,866

MEAN SALARY BY SECTOR	(Annual)
Self-Employed	$129,293
Municipal	$77,204
Provincial	$85,571
Federal	$80,565
Oil & Gas	$106, 598
Consulting	$90,458
Academia	$74,445
ENGO	$91,069
Industry	$95,639
Other Industries	$85,629

MEAN SALARY BY EDUCATION	(Annual)
B.Sc	$88,973
Masters	$95,823
Ph.D	$111,060

MEAN SALARY BY YEARS OF EXPERIENCE	(Annual)
0-2 Years	$55,673
3-5 Years	$70,919
6-10 Years	$84,820
11-15 Years	$108,500
16-20 Years	$116,733
>20 Years	$132,996

Clarifying the definition of the practice of biology

In the words of the ASPB Practice Review Committee Chair Carol Engstrom, P. Biol., her committee "has had an active year!" One important task, now completed, was to return to the basics and better define the Society's definition of "What is Biology":

"Biology is the natural science concerned with the study, regulation or management of life and living organisms, including their ecology, structure, function, growth, evolution, distribution and taxonomy and the application of those principles."

This definition was endorsed by the ASPB Board of Directors at a December (2014) board meeting, and will help the registration committee as it moves forward with admitting new classes of members.

The Practice Review Committee also oversees the Society's continuing competency program (an important part of maintaining professional status). Engstrom reports that 2014 was the first full year the committee was able to collect data on members using the newly-developed "app". 869 Professional Biologists completed their continuing competency requirements, with only 1.6% not submitting the recommended 35 professional development hours (PDH) per year and 48% of biologists who submitted more than 100 PDH in 2013. With the requirement of 105 PDH over a three year period, it will take two more years before a full audit can be completed.

Is the Green Tortoise Beetle finding a home in Alberta ?

by Al Popil and Robin Leech, P. Biol.

Early in May 2014, members of the public in Alberta began finding an oval green beetle about 6-7 mm long (Figs 1, 2) on plants, especially on Canada Thistle leaves, where these beetles were "doing quite a number on the thistles". A few pictures, with requests for identification of this new find, turned up on the Alberta listserver: *albertabugs@mailman.srv.ualberta.ca*. It was quickly identified as the Green Tortoise Beetle or the Thistle Tortoise Beetle, *Cassida rubiginosa* Müller, 1776, by a number of Alberta entomologists, and some keen amateurs. It is also called the Green Thistle Beetle, among several other names.

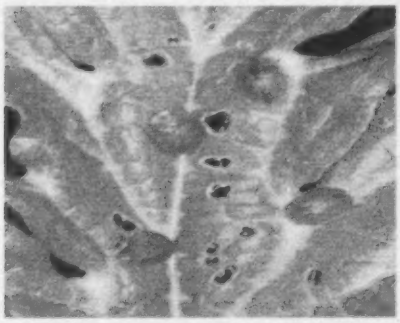


Fig. 1. Adult Green Tortoise Beetles feeding on greenhouse artichokes.

Fig. 2. Showing size of the adult Green Tortoise Beetle on a Canadian dime.

The **Green Tortoise Beetle** is one of a number of species of tortoise beetles. Depending on whose classification you follow, they are either in the family Chrysomelidae, subfamily Cassidinae, or a separate and independent family, Cassididae. The chrysomelids are commonly called leaf beetles. The special name, **tortoise beetle**, is given to the cassidids because of their shape, and because of their reaction when disturbed. When they are disturbed, the adult beetles behave just as a tortoise does by pulling in the body extensions (in this case, head, antennae and feet are pulled in and under their "shell"), then hanging on tightly to the leaf they are on. They have large pads on their tarsi (or feet) and these function just like those on a frog or a gecko lizard. The main enemy of these beetles is ants. When a beetle pulls up tightly to the leaf, the rim of the "shell" forms a tight bond with the leaf, and the ants cannot pry the beetle loose.

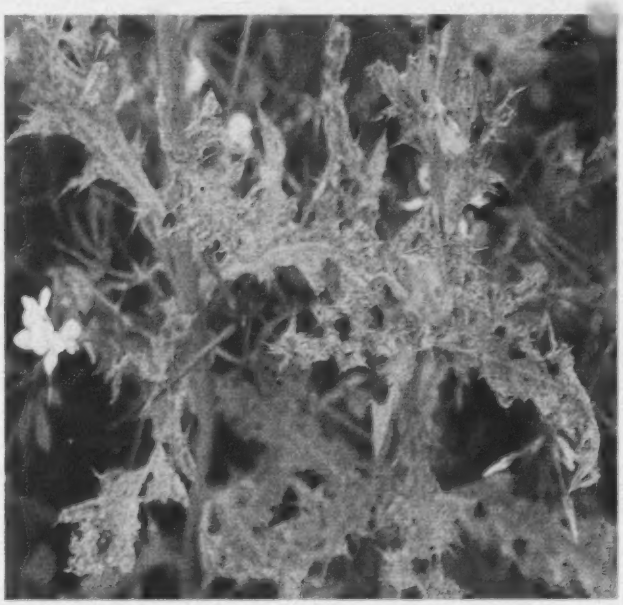


Fig. 3. Damage done to Canada thistle in St Albert by the Green Tortoise Beetle.

The Green Tortoise Beetle has a widespread natural range that includes Europe, the Mediterranean, North Asia and North Africa. Following its accidental introduction to Québec in 1901, it has since spread to New Brunswick and Alberta, and to the USA. In some places where it has become established, it is used as a biocontrol agent, for example, in Virginia, USA, where it feeds on Canada thistle (Fig. 3). But it has intentionally not been distributed to other parts of North America where there is a risk of damage to native North American thistle varieties.

The Green Tortoise Beetle was taken to New Zealand in 2006, where it is used as a biological control agent against Canada thistle. In New Zealand the beetle has been given another name, the Green Thistle Beetle, by landowners and biologists. It is estimated that in New Zealand the Canada thistle (where it is known as "California Thistle") costs landowners around $32 million per year in the Otago and Southland areas alone (2007 estimate). Beetle populations were established by 2007 and since have had localized impacts on Canada thistle.

What has the Green Tortoise Beetle been feeding on in Alberta?

Up to this year (2014), the Green Tortoise Beetle has been rather rare in Alberta and has not been of any concern. In fact, until the spring of 2014, the University of Alberta's Strickland Museum Collection did not have even one beetle from Alberta. But that is no longer the case, as several live specimens have been given to the Strickland Museum Collection by the senior author of this article. The Green Tortoise Beetle usually feeds commonly on Canada thistle and other members of the tribe Cardueae (the thistle tribe, family Asteraceae). Laboratory tests from New Zealand reported that in the lab the beetle fed on Globe Artichoke *(Cynara scolymus)* and safflower *(Carthamus tinctoria)* (both related to thistles), but then said that there are no records of

This article continues on page 10

Green Tortoise Beetle, cont'd from page 9

this beetle ever being a pest on these plants in the field.

However, it seems that there was an outbreak in Oregon in 2008 involving this beetle on globe artichokes. In late June 2014, in St. Albert, Alberta, Jim Hole of Hole's Greenhouses, and some of his employees, have found hundreds of beetles on globe artichoke plants raised from seeds and put in pots outside and next the greenhouse (Fig. 4). Jim Hole reported to us that the observed damage to the artichokes is not as severe as that seen to Canada thistle. We suggest that the beetles be given a bit of time and opportunity, and then have the damage re-assessed. It seems they feed readily on species of Cardueae (the thistle tribe).

Where should we look for the Green Tortoise Beetle, its eggs and larvae?

Towards the end of winter, the adult beetles emerge on warm days to feed on the new young Canada thistle leaves (see Fig. 1) that appear in spring. They make round holes in these leaves. Adults can be found feeding on thistles from early spring until late autumn. The beetles are oval in shape, top side green and the underside black.

The eggs will hatch about a week after being laid, and the creamy white larvae are very distinctive. They have prominent spines along the side of the body and a forked tail spine. Onto these spines the shed or molted skins accumulate, along with its own fecal material (Fig. 5). These form a protective umbrella over the top of the larvae, and also serve to camouflage the larvae from potential predators (such as birds, yellow jackets and hornets).

The larvae feed and increase in size through 5 skin sheddings or moltings. The stage between moltings is called an instar. The first 3 larval instars feed on the underside of leaves, and the last 2 feed on the upper side of leaves. The development from the egg to the adult takes about 6 weeks, and in our climate, there would be only one generation per year.

The adults live for about 80 weeks - this means they survive for at least two summers. They lay groups of eggs in a brownish case on the undersides of leaves at the base of the plant. Each female can lay as many as 1,000 eggs during the warm season. Because the egg laying is carried out over an extended time, there will often be all life stages present at the same time.

The life stages for a beetle are: egg, 5-instars of larva, pupa and adult. This is called a complete metamorphosis. Grasshoppers, in comparison, have a gradual metamorphosis, where the young grasshopper, when it emerges from the egg looks like a grasshopper.

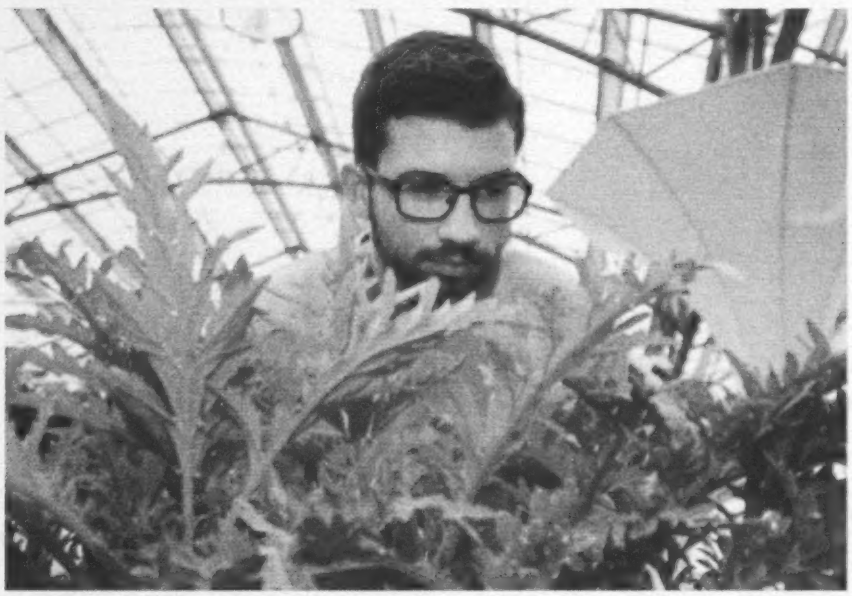


Fig. 4. Tyler Hildebrandt, an employee at Hole's Greenhouses in St. Albert, checks for damage by the Green Tortoise Beetle on artichokes and other plants.

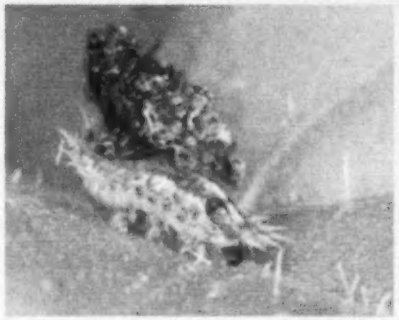


Fig. 5. Green Tortoise Beetle, 4th or 5th instar larva, showing the shed skins and feces on top of the larva which offer both protection and camouflage.

The pupae are distinct and easy to recognize. They are brown with black spines around the edges. The pupae are found on a leaf stem, and if the pupae are disturbed, they flip back and forth. This is a protective behavior also observed with caterpillars and pupae of many insect groups

If readers find any stages of this beetle, please take a few sharp, close-up digital pictures and send them to the authors. We will answer all enquiries.

Acknowledgements

As everyone knows, science progress and new knowledge do not develop in a vacuum, and very rarely by one person working alone. For information provided during the writing of this article, we thank Jim Hole (beetles feeding on his globe artichokes), and Michelle and Tyler of Hole's Greenhouse, St. Albert; Alec McClay, PhD, P. Biol. (information about the beetle); a review by Dr. George Ball; various sources on the Alberta Bugs Listserver; and the internet searches of Green Tortoise Beetle and Artichoke Beetle.

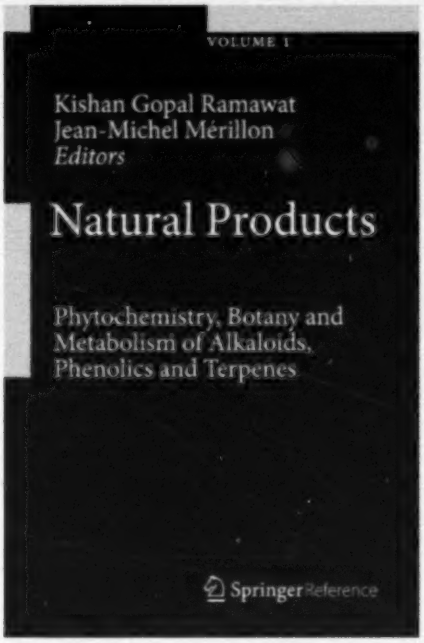
Al Popil, a professional photographer, lives in St. Albert. The pictures were taken in 2014 with a Canon MP-E 65 mm, f2.8, 1-5X macro photo lens. alpopil@interbaun.com

Robin Leech, P. Biol., works on spiders and binoculars, and lives in Edmonton. releech@telus.net.

Editor's Note: *This article, formerly titled Green Tortoise Beetle, a.k.a. Thistle Tortoise Beetle, was first published by the Alberta Society of Professional Biologists in the Society's Alberta Biologist Monthly (E-newsletter), November 2014.*

An in-depth look at natural products

by Saikat Kumar Basu



Plants constitute an important aspect of our ecology and environment and have provided us with food, fodder, fiber, fertilizer, shelter and medicine from the very dawn of human civilizations across the planet. Plants are important sources of several drugs and medicines, nutraceuticals and pharmaceutical products due to the presence of a wide diversity of different *phytochemicals* (chemicals of plant origin, *'phyto'* refers to plant in Greek from where this word has been derived) such as different alkaloids, phenolics, flovanoids, carotenoids, terpenoids, tannins and anthocyanins to name only a few. Specific microbes and fungi are also responsible for the production of various natural products with medicinal importance and together with plants they constitute a valuable natural resource which has been used from time immemorial.

Research on medicinal plants has progressed exponentially over the past six decades and has successfully generated a tremendous amount of valuable information useful for researchers which could be used in designing drugs and medicines and successfully used for treatment of several diseases and ailments. Particularly with the latest development in the varied realms of life sciences, chemistry, pharmacology, pharmacognosy, biochemistry, molecular biology and biotechnology, further progress in several advanced instrumentation techniques and methods have significantly advanced research related to natural products.

This publication has been instrumental in exploring different phytochemicals and herbal extracts under one umbrella, with comprehensive information about several bioactive molecules, their corresponding sources, origins and biosynthesis, their chemical nature, organoleptic properties and other essential attributes along with their biological role and therapeutic applications. I found this seminal series in five volumes, to be a valuable contribution to science that will be extremely helpful for academics, scientists, researchers and students in the disciplines of botany, phytochemistry, pharmacy, pharmacognosy, medicinal plants, food and nutrition sciences, agricultural sciences and biotechnology. The broadly covered topics in the context of several natural products discussed under various chapters have also highlighted on genetics, biotechnology and genetic engineering, biotransformation, plant cell, tissue and organ cultures, fungal products, metabolome and metabolic engineering. The entire series has marvelous collections of illustrations, coloured plates, flow charts, schematic diagrams and graphs, summary tables, schematic metabolic pathways and different chemical structures of medicinally important compounds and chemical complexes discussed across the chapters. An excellent bibliography provided at the end of each chapter is an important resource for enthusiastic readers and serious researchers seeking additional information.

This comprehensive five volume series has contributions from highly reputable and respected research groups across the globe, and is divided into 139 chapters in five volumes, as follows: **Volume 1:** Part I Alkaloids: General Biology and Biotechnology and Part II Alkaloids: Classes - Occurrence, Biosynthesis, Structure and Chemistry, Distribution; **Volume 2:** Part III Alkaloids: Methods of Analysis, Part IV Alkaloids: Pharmacology and Part V Phenolics: General Biology and Biotechnology; **Volume 3:** Part VI Phenolics: Classes - Occurrence, Biosynthesis, Structure and Chemistry, Distribution, Part VII Phenolics: Methods of Analysis and Part VIII Phenolics: Biological Activity and Bioavailability. **Volume 4:** Part IX Phenolics: Nutraceuticals and Functional Foods, Part X Terpenes: General Biology and Biotechnology and Part XI Terpenes: Classes - Occurrence, Biosynthesis, Structure and Chemistry, Distribution; and **Volume 5:** Part XII Terpenes: Methods of Analysis, Part XIII Terpenes: Pharmacology and Bioavailability and Part XIV Terpenes: Parapharmaceutical Uses.

The language of the series is worth mentioning because of its simplicity and for the cautious attempt to avoid being excessively technical, and the use of that style has further contributed towards the attraction for this unique five-volume series. The simplistic yet comprehensive style adopted by the editors, along with great attention to detail (including a comprehensive index) and the overall design, will certainly empower readers to navigate comfortably through the pages with delight.

The Details: **Natural Products: Phytochemistry, Botany, and Metabolism of Alkaloids, Phenolics and Terpenes** by *Kishan Gopal Ramawat* and *Jean-Micheal Mérillon* (Editors), Springer-Verlag Berlin Heidelberg, 2013, XLII, 4242 p. 1569 illus., 307 tables, 239 illus. in color in 5 volumes (not available separately). Hardcover, ISBN 978-3-642-22143-9, Price: $3000.00; E-book, ISBN 978-3-642-22144-6; Price: $3000.00; Hardcopy + EBook, ISBN: 978-3-642-22145-3, Price: $3750.00.

2015 ASPB CONFERENCE

Witness to Change

"A Generation of Science, Regulation and Conservation"

40th ANNIVERSARY

ASPB
ALBERTA SOCIETY
PROFESSIONAL BIOLOGISTS

March 31 - April 1, 2015

Coast Canmore Hotel & Conference Centre
Canmore, Alberta

The conference will celebrate forty years of the professional practice of biology in Alberta and the growing public demand for accountability in the management of our ecosystems. It will examine changes we have witnessed on the landscape over the last 40 years in the province, and the current public perceptions of working biologists.

This will be an excellent opportunity for biologists, regulators, resource managers and industry to learn about and discuss how biology affects policy decision making and the future of biological resources in Alberta. Topics will include how all sectors can work together to protect resources in the province, Alberta's history of regulating remediation and reclamation and, of course, the impact of the 2013 flood in southern Alberta.

For more information and to register, go to www.aspb.ab.ca/conference

PHOTOGRAPHY BY BOB COOK

The Alberta Society of Professional Biologists (ASPB) is a professional society which is committed to the promotion of excellence in the practice of biology.